ANNUAL REPORT FOR 2010



Jeffrey's Warehouse Wetland Mitigation Site Wayne County TIP No. R-1030AA



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December 2010

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SUMMARY

The following report summarizes the wetland monitoring activities conducted during 2010 at the Jeffrey's Warehouse Mitigation Site. This site, situated on US 117 in Goldsboro, was designed and constructed during 2006 by the North Carolina Department of Transportation (NCDOT) in order to provide mitigation for wetland impacts associated with the construction of Transportation Improvement Program (TIP) number R-1030AA. This report provides the monitoring results for the fourth formal year of monitoring (Year 2010). The site must demonstrate hydrologic and vegetation success for a minimum of five years or until the site is deemed successful.

The site hydrology is monitored with ten groundwater gauges and one surface water gauge. Groundwater gauges nine and ten were installed at the end of the first growing season and were not included in the first formal year of monitoring. Four of the ten groundwater gauges met the jurisdictional criteria for wetland hydrology (>12.5% of the growing season) in 2010. A surface water gauge was installed at the end of 2007 to record stream flow. Based on the streams design parameters, data indicates that six bankfull events occurred during the 2010 monitoring period.

Eight vegetation plots were established to monitor the trees planted in the 26.3 acre restoration site. NCDOT replanted the site in March 2007 due to low survival counts for the 2006 planting. The 2010 vegetation monitoring revealed an average density of 468 trees per acre, which is well above the minimum success criteria of 290 trees per acre. The area around plots six and seven were supplementally planted in January 2008 to increase plan survivability. Vegetation plot six was failing during the 2007 monitoring evaluation and the atplanting numbers for vegetation plots six and seven now reflect the supplemental planting that occurred in January 2008.

NCDOT will continue hydrologic and vegetation monitoring at the Jeffrey's Warehouse Mitigation site in 2011.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the wetland monitoring activities that have occurred during 2010 at the Jeffrey's Warehouse Mitigation Site. The site is located adjacent to US 117 in Goldsboro (Figure 1). The site was constructed to provide mitigation for wetland impacts associated with (TIP number) R-1030AA in Wayne County. The 87.7 acre site provides 3.66 acres of riverine wetland restoration, 23.02 acres of non-riverine wetland restoration and 12.36 acres of non-riverine wetland preservation. The site also provides 7.26 acres of Neuse Buffer restoration.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five years or until success criteria are satisfied. Success criteria are based on federal guidelines for wetland mitigation. Criteria for hydrologic conditions and vegetation survival are included in these documents. The following report details the results of hydrologic and vegetation monitoring during the 2010-growing season at the Jeffrey's Warehouse Mitigation Site.

1.3 Project History

March/April 2006	Site Planted and Live Staked
March 2007	Site Replanted
March-November 2007	Hydrologic Monitoring (Year 1)
August 2007	Vegetation Monitoring (Year 1)
January 2008	Supplemental Planting Surrounding Plots 6 & 7
March-November 2008	Hydrologic Monitoring (Year 2)
June 2008	Vegetation Monitoring (Year 2)
March-November 2009	Hydrologic Monitoring (Year 3)
June 2009	Vegetation Monitoring (Year 3)
March-November 2010	Hydrologic Monitoring (Year 4)
June 2010	Vegetation Monitoring (Year 4)

1.4 Debit Ledger

Table 1. Jeffreys Warehouse Mitigation Site Debit Ledger

Jeffreys Warehouse	Wetland and Stream Types								
TIP DEBITS	Riverine Wetland Restoration	Non-Riverine Wetland Restoration	Riverine Wetland Preservation	Stream Restoration	Neuse Buffer Restoration				
B-3528				452	75,577				
B-4300					40,075				
R-2719A		2.76			172,387				
B-4592					16,398				
B-4304	0.92				3,653				
U-3344A				25	45,558				
U-4011				61					
R-2814A&B	2.49	1.77	3.05						
U-4707				222	24,458				
B-4600					7,113				
R-2719A MOD					450				
SR 1340 2C.054015					11,393				
As-Built Quantity	3.66	23.02	12.36	3,731	689,607				
Acres Remaining	0.25	18.49	9.31	2,971	292,545				

Note: Debit ledger information up to date as of December 2, 2010.

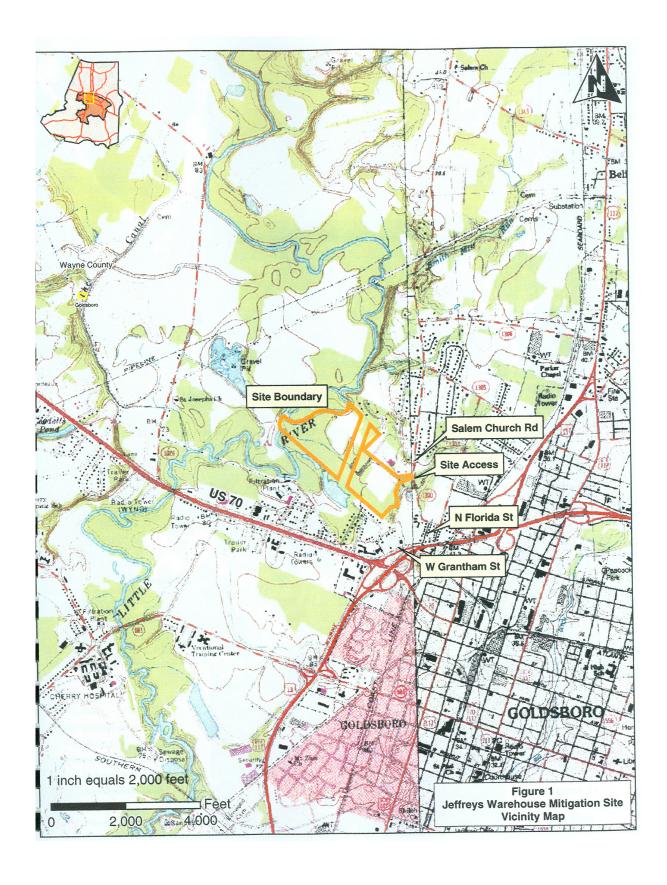


Figure 1. Site Location Map

2.0 HYDROLOGY

2.1 Success Criteria

In accordance with the mitigation plan and permit for wetland mitigation, the success criteria for hydrology states that the area must be inundated or saturated (within 12" of the surface) by surface or ground water for at least a consecutive 12.5% of the growing season. Areas inundated less that 5% of the growing season are classified as non-wetlands. Areas inundated between 5% and 12.5% of the growing season can be classified as wetland depending upon factors such as the presence of hydrophytic vegetation and hydric soils.

The growing season in Wayne County begins March 17 and ends November 14. These dates correspond to a 50% probability that temperatures will remain above 28° F or higher after March 17 and before November 14. The growing season is 243 days; therefore hydrology for 12.5% of the growing season is at least 30 consecutive days, while 8.0% would be equivalent to 18 days. Local climate must represent average conditions for the area in order for the hydrologic data to be valid.

2.2 Hydrologic Description

Ten groundwater monitoring gauges and one surface water monitoring gauge are used to record site hydrologic data. Gauges nine and ten and the surface water gauge were not installed until the end of the 2007 growing season and were not monitored until the 2008 monitoring year. The groundwater gauges are set to record daily water levels wile the surface water gauge is set to record at 3-hour intervals. The hydrologic response (groundwater) to rainfall events is evaluated using data provided by the North Carolina State Climate Office.

Appendix A contains a plot of the water depth for each of the groundwater and surface water monitoring gauges for 2010. Precipitation events, provided by the State Climate Office, are included on each groundwater graph as bars.

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

The total number of consecutive days that the groundwater was within twelve inches of the surface was determined for each groundwater monitoring gauge. This number was converted into a percentage of the growing season. Table 1 presents the hydrologic results for 2010. Figure 3 is a graphical representation of the hydrologic monitoring results for 2010.

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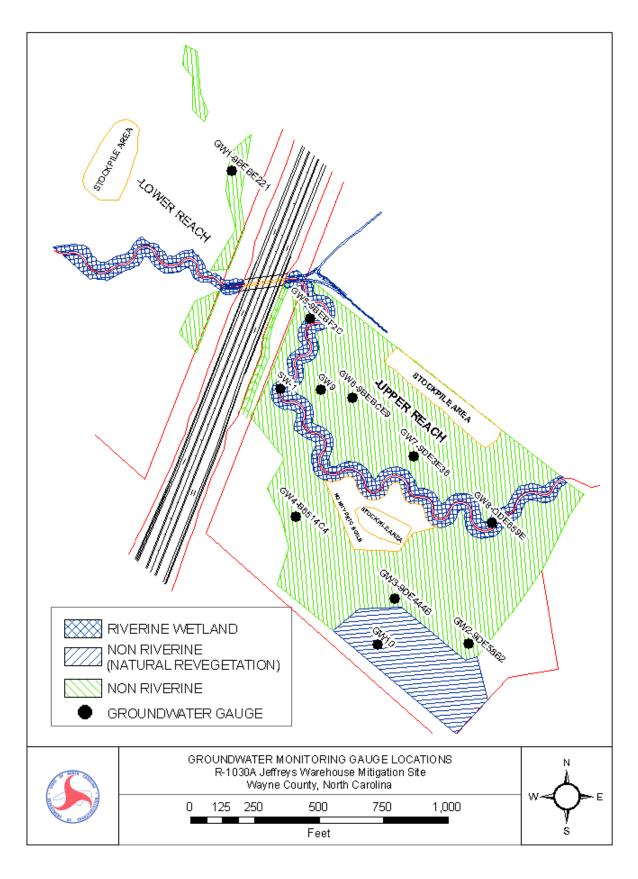


Figure 2. Monitoring Gauge Location Map

Table 2. 2010 Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 – 12.5%	> 12.5%	Actual %	Dates of Success	
JWGW-1		X		11.1		
JWGW-2		X		9.5		
JWGW-3	X			3.7		
JWGW-4			x	22.2	Mar 17-May 8; Sept 27- Nov 14	
JWGW-5			x	63.4	Mar 17-Aug 16; Sept 27 Nov 14	
JWGW-6	X			4.5		
JWGW-7		X		5.3		
JWGW-8			x	42.8	Mar 17-June 27; Sept 27-Nov 14	
JWGW-9		X		6.6		
JWGW-10			Х	22.2	Sept 27-Nov 14	

^{*}Appendix A contains plots of surface and groundwater data during 2010.

2.3.2 Climatic Data

Figure 4 is a comparison of monthly rainfall for the period of January 2010 through November 2010 to historical precipitation (collected between 1980 and 2009) for Wayne County, Cherry Research Station. This comparison gives an indication of how 2010 relates to historical data in terms of climate conditions. The NC State Climate Office provided all local rainfall information.

For the 2010-year, January, February, March, May, July and August experienced average rainfall. The months of April, June, October and November recorded below average rainfall for the site while September recorded above average rainfall. Overall 2010 experienced an average rainfall year.

2.4 Conclusions

The 2010 year represents the fourth full growing season that hydrologic data has been collected on the Jeffrey's Warehouse Mitigation Site. Four of the ten groundwater monitoring gauges met the jurisdictional criteria wetland hydrology (>12.5% of the growing season), while four groundwater gauges met between 5% and 12.5% of the growing season.

NCDOT will continue to monitor the hydrology at the Jeffrey's Warehouse Mitigation Site in 2011.

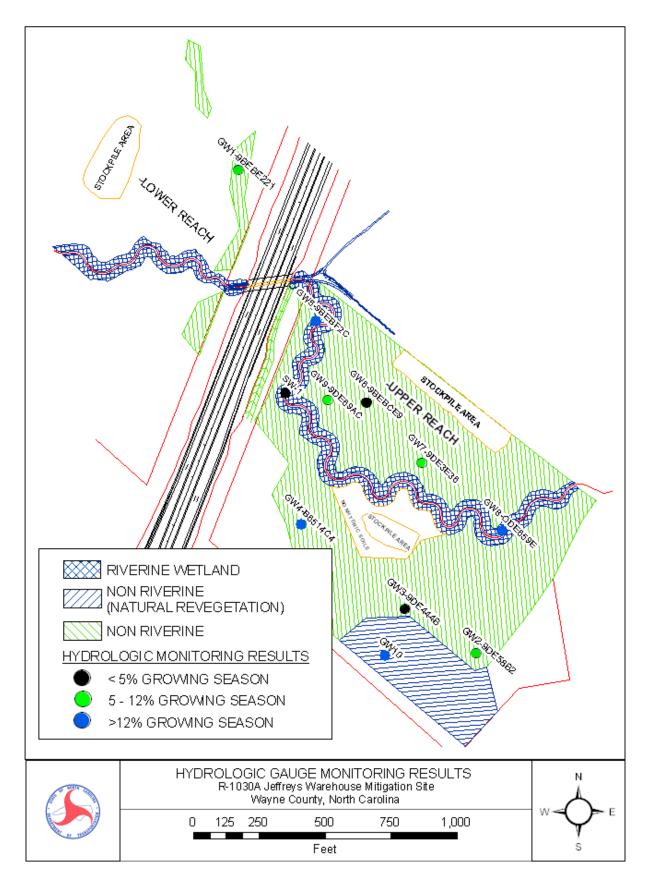


Figure 3. 2010 Hydrologic Monitoring Results

Jeffreys Warehouse 30-70 Graph Goldsboro, NC Monthly Precipitation

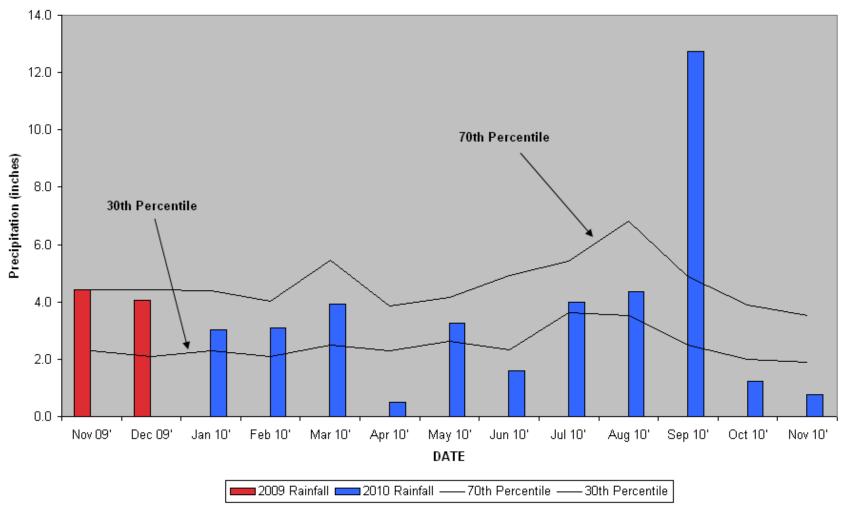


Figure 4. 30-70 Percentile Graph 2010

3.0 VEGETATION: JEFFREY'S WAREHOUSE MITIGATION SITE (YEAR 4 MONITORING)

3.1 Success Criteria

The success criteria states that there must be a minimum of 320 tree per acre living for at least three year consecutive years. A minimum of 290 trees per acre must be living at year four and a minimum of 260 trees per acre must be living at year five.

3.2 Description of Species

The following live stakes were planted on the streambanks:

Salix nigra, Black Willow

Cornus amomum, Silky Dogwood

The following tree species were planted in the Riverine - Bankfull Bench Area:

Quercus laurifolia, Laurel Oak

Quercus Iyrata, Overcup Oak

Quercus phellos, Willow Oak

Quercus nigra, Water Oak

Quercus michauxii, Swamp Chestnut Oak

Betula nigra, River Birch

The following tree species were planted in the Non-Riverine Wetland Area:

Quercus laurifolia, Laurel Oak

Quercus phellos, Willow Oak

Quercus michauxii, Swamp Chestnut Oak

Quercus falcata var. pagodaefolia, Cherrybark oak

Nyssa aquatica, Water Tupelo

3.3 Results of Vegetation Monitoring

Table 3. Vegetation Monitoring Statistics

Plot#	Laurel Oak	Overcup Oak	Willow Oak	Water Oak	Swamp Chestnut Oak	River Birch	Cherrybark Oak	Water Tupelo	Total (3 Year)	Total (at planting)	Density (Tree/Acre)
1	1	1			2	12			16	37	294
2	2		8	1	17		14	4	46	47	666
3	3		3		15		9		30	40	510
4	7		6				27		40	45	604
5	2	1	1			4			8	33	165
6			2		5		12	5	24	42	389
7	5		4		6		14	3	32	39	558
8		15			4	9			28	34	560
	Average Tree Density									468	

Site Notes: Other species noted: lespedeza, cattail, black willow, silky dogwood, ragweed, fennel, *Juncus* sp., sweetgum, goldenrod, wax myrtle, multi-flora rose, red maple, tear thumb, briars, alder, *Baccharis* sp., poison ivy, pine and various grasses. River birch was also noted volunteering in the Non-Riverine Wetland. Beaver activity continues to be a problem on site and NCDOT is working with USDA to manage the beaver activity. Vegetation Plot #5, as noted in the 2009 report, is showing a significant loss in trees due to beaver activity on site. However, around the vegetation plot's perimeter the following tree species are surviving: river birch, laurel oak, swamp chestnut oak, water oak, tag alder, and black willow.

3.4 Conclusions

Approximately 26.3 acres of this site was planted in March and April 2006. NCDOT replanted the site in March 2007 due to low survival counts from the 2006 planting. The area around plots six and seven were supplementally planted in January 2008 to increase plant survivability in this area. The at-planting numbers for vegetation plot six and seven reflect this supplemental planting that took place in January 2008. There

were eight vegetation monitoring plots established throughout the Riverine and Non-Riverine areas. The 2010 vegetation monitoring revealed an average density of 468 trees per acre, which is above the minimum success criteria of 290 trees per acre. NCDOT will continue to monitor the vegetation at Jeffreys Warehouse Mitigation Site in 2011.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

The 2010 year represents the fourth full growing season that hydrologic data has been collected on the Jeffrey's Warehouse Mitigation Site. Four of the ten groundwater monitoring gauges met the jurisdictional criteria for wetland hydrology (>12.5% of the growing season), while four groundwater gauges met between 5% and 12.5% of the growing season.

There were eight vegetation monitoring plots established throughout the Riverine and Non-Riverine areas. The 2010 vegetation monitoring revealed an average density of 468 trees per acre, which is well above the minimum success criteria of 290 trees per acre.

NCDOT will continue hydrologic and vegetation monitoring at the Jeffrey's Warehouse Mitigation Site in 2011.

APPENDIX A DEPTH TO GROUNDWATER CHARTS



Jeffrey's Warehouse



Photo 1



Photo 2



Photo 3



Photo 4



June 2010



Photo 6

Jeffrey's Warehouse

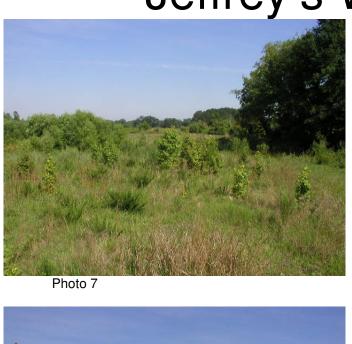




Photo 8



Photo 9



Photo 10



Photo 11 June 2010



Photo 12

Jeffrey's Warehouse



Photo 13

